

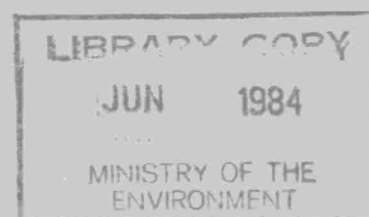
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Snow sampling study in the
vicinity of Cochrane Enterprises,
Cochrane, Ontario.

February, 1982.

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Snow Sampling Study in the Vicinity of
Cochrane Enterprises
Cochrane, Ontario

February, 1982

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NER-AQTM-04-84



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Snow Sampling Study at Cochrane, 1982

Introduction

A large poplar plywood manufacturing plant is operated in the Town of Cochrane by Cochrane Enterprises Ltd. In the production process, large quantities of wood chips and sawdust are generated and these are piled in the yard outside the plant building. These piles are believed to be of the source localized particulate fallout problem when wind erodes fine materials from the piles. As part of an attempt to determine the extent and degree of the problem, a snow sampling program was carried out in the winter of 1982 at the request of the Timmins District office. This report summarizes the findings of that investigation.

Sample Collection

A collection of snow samples was made on February 8, 1982 at five locations in the vicinity of plywood plant. These locations are shown in Figure 1. The locations of the sampling stations with respect to the plant are as follows.

Site	Distance and Direction
1	450 m ENE
2	600 m ENE
3	450 m NE
4	950 m NE
5	150 m NNW

At each sample location, duplicate samples of snow were collected. The samples consisted of circular cores of snow, 7.5 cm in diameter and represented a complete profile of the snow from the surface to the ground level. The sample was taken in such a manner as to avoid contamination by ground materials. The number of cores required to fill 6.5 kg polyethylene bags was recorded. At the time of sampling, the total depth of snow was recorded as well as depth of fresh snow and the number of crust layers. Notes were made on the number and type of any banding or layering in the snow profile.

The samples were returned to the laboratory and allowed to melt overnight at room temperature in the polyethylene bags. The volume of snow meltwater was measured and a pH measurement taken immediately. The presence and type of particulate in the meltwater was noted and rated on an arbitrary scale of none to heavy. The samples were forwarded to the M.O.E. laboratory at Resources Road, Toronto, for analysis of the sulphate, sodium, chloride, total particulate, particulate total carbon, dissolved organic carbon and dissolved inorganic carbon content at the suggestion of laboratory staff.

Results and Discussion

The condition and depth measurements of the snow samples are shown in Table 1. Snow depths ranged from 33 to 86 cm. Up to seven yellowish bands were observed in the snow profiles at Sites 1, 2 and 3. Fine wood particles were present on the snow surface at Site 1. No banding was observed at Site 4 but two grey brown bands were seen in the snow

profile at Site 5. Yellow to yellowish brown particulate was observed in all samples with the greatest quantities being present in samples from Site 1. Lower amounts were seen in samples from Sites 2 and 3 while the least was present at Sites 4 and 5.

The analytical test results are presented in Table 2. The slight elevation in sodium and chloride content in samples from Sites 3 and 4 can be attributed to the traffic associated with these sites, although the actual traffic volume in the area is considered to be very low. The sulphate concentration at Site 1 was slightly elevated in comparison to the other four sites. The total particulate measured in the samples followed the pattern suggested by the ratings given to observed particulate in the meltwater. Total particulate, particulate total carbon and dissolved organic carbon all showed the highest concentrations in the samples from Site 1, followed by Sites 2 and 3 while lower amounts were present at Sites 4 and 5. From 40 to 50 percent of the total particulate consisted of particulate total carbon at Sites 1, 2 and 3. A similar proportion of the total particulate was made up of particulate total carbon at Site 5, however the total particulate load in the snow was low.

The location of the wood chip pile is east of the plywood plant, placing the chip pile much closer to the snow sampling sites than to the plywood plant. Thus the sampling sites nearest to chip pile would be Site 1, Site 3 and Site 2 and therefore these sites are much more subject to the deposition of materials lost from the wood chip piles. Some particulate was found in the snow as far as 950 m (at Site 4) from the plywood complex.

Summary and Recommendations

A snow sampling survey was carried out at five locations in the vicinity of Cochrane Enterprises, Cochrane, in February of 1982. The results of the sampling showed that the wood chip piles are probably the major source of particulate material up to a distance of over 900 m in a northeasterly direction. Tests for the total particulate and particulate total carbon appear to be useful tests for delimiting sources of materials such as fine wood materials, however, the problem of dilution of contaminants in the snow profile by fresh clean snow would create difficulty in comparing data between months and years in repeated surveys. The results should therefore only be considered as qualitative for individual surveys only. If the problem of wind blown materials continues, then perhaps consideration could be given to the establishment of a small dustfall jar network (3 - 4 jars) in order to better estimate the deposition of wood particulate material.

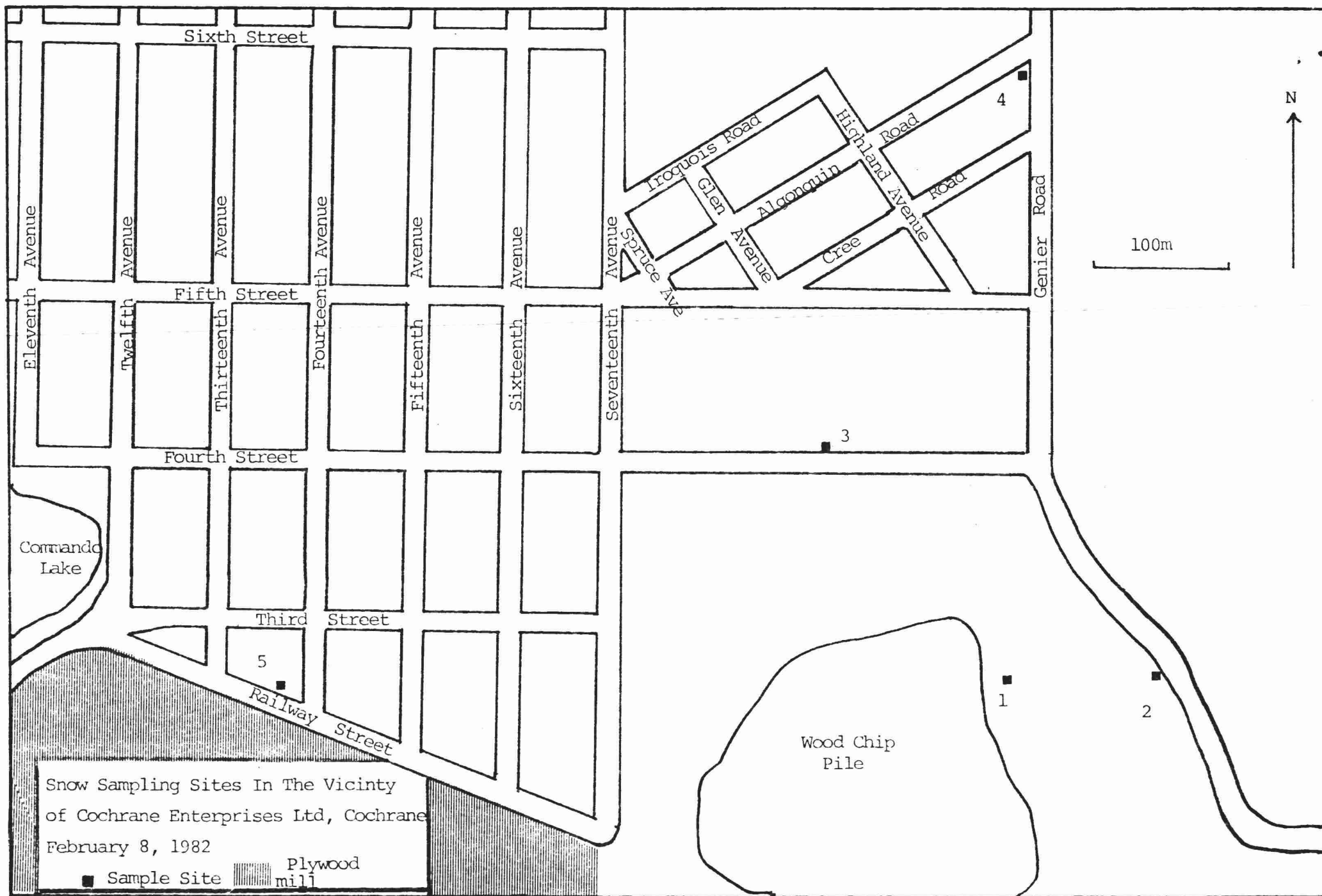
Table 1: Condition and Depth of Snow Samples in the Vicinity of Cochrane Enterprises at Cochrane, February, 1982.

	Site				
	1	2	3	4	5
Snow Depth	86	78	64	33	54
Crust Layers	0	0	0	0	0
Banding	7, yellowish, fine wood particles on surface	3, yellowish bands	6, light brownish yellow	-	2, grey brown
Particulate in meltwater	heavy suspension of moderately fine yellowish particulate	moderate, medium yellow-brown particulate	moderate, medium yellow-brown particulate	light, fine yellowish particulate	light, fine yellowish particulate

Table 2: Concentrations of Selected Elements in Snow Samples Collected in the Vicinity of Cochrane Enterprises at Cochrane, February, 1982

Element	Site				
	1	2	3	4	5
SO ₄	4.2	1.0	1.6	1.4	1.1
Na	1	1	6	4	1
Cl	1.2	0.7	7.8	5.8	0.9
Particulate	415	80	93	38	17
Particulate Total Carbon	205	33	39	9	8
Dissolved Organic Carbon	8.7	2.9	3.8	1.9	1.5
Dissolved Inorganic Carbon	.9	.3	1.3	.5	.4
pH	4.4	4.3	5.5	5.1	4.5
Percent particulate carbon*	49	44	42	24	47

* $\frac{\text{Particulate total carbon}}{\text{Particulate}} \times 100\%$



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